Botanical Gazette.

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Editorial.—The American Forestry Association held its first annual meeting in Cincinnati, April 25–29. With Dr. John A. Warder as President, the convention could not well help being one of great interest.

Mr. Thomas Meehan writes that the European snowdrop flowered near Philadelphia on the 1st of April this year, and that *Fritillaria pudica*, within a few feet of it, was only four days after.

Joseph Decaisne, the most eminent botanist in France, the director of the *Jardin des Plantes* ever since the death of Mirbel, the Professor of Culture in the Museum of Natural History at Paris for more than forty years, died on the 8th of February, 1882, in the 75th year of his age.

We have just received information of the death of Mr. William H. Leggett, for so long a time the editor of the *Torrey Bulletin*. He died April 11th and in the absence of particulars we will await the notice which will appear in the journal with which he has been so honorably connected.

Mr. Thomas Howell, of Sauvies' Island, Oregon, has published a catalogue of the plants of Oregon, Washington, and Idaho, including the mosses. He offers to furnish botanists their desiderata at ten cents, and full sets at five cents per species. Mr. Howell's plants have proved very satisfactory.

The Agricultural College at Lansing, Michigan, seems to have quite an active Natural History Society, judging from accounts of it given in *The College Speculum*. Prof. W. J. Beal, of course, contributes largely to the botanical interest, but the best of it is that he is ably assisted not only by professors but by students.

Part V, of Dr. Braithwaite's British Moss-Flora, published at the close of the last year, has come to hand. It contains *Leucobryum* and a part of the *Dicranaceæ*. Twenty-five species are beautifully figured on the three plates. This work is specially recommended to American botanists. Even if we get our long hoped-for Manual, we shall still need an illustrated work like this.

Prof. C. E. Bessey has recently met with a severe loss which calls forth the sympathies of his many botanical friends. On April

8th a tornado struck North Hall of Iowa Agricultural College, carrying off the roof and crushing in the botanical laboratory, botanical lecture room, and the room in which were the Professor's library, cabinet and herbarium. His work is now carried on in another building. The herbarium is saved in packages, but the case is still in the wrecked building, exposed to rains and storms. The library was mostly saved, but badly hurt by rain, lime and crushing. The building is to be repaired soon and the Professor expects to be back in his old quarters by midsummer.

MR. VOLNEY RATTAN has published a popular "California Flora," or "Manual of Botany for Beginners," which has just appeared in a third edition, revised and enlarged. It contains some introductory lessons and condensed descriptions of plants with conspicuous flowers, numbering something over 600. The most difficult orders, such as *Umbelliferæ, Compositæ*, etc., are not described, being too difficult for beginners. The book seems a most excellent one for its purpose, and well calculated to be a stimulus to the study of botany in the schools of California. Many a book of this kind has come from the necessities of an enterprising teacher, for our specialists will not always attend to the wants of beginners.

THE GREAT COLLECTIONS of the late Professor E. Fries, are now offered for sale by his heirs. They consist of an herbarium of extra-Scandinavian phanerogams of about 40,000 species; an herbarium of Sandinavian phanerogams, complete and containing the types of Prof. Fries' works on the Flora of Scandinavia; a collection of fungi, containing original specimens of Prof. Fries' own species and of those of almost all other mycologists in this century; a collection of about 1,500 drawings of fungi, most of which are colored; a collection of mosses; a collection of algæ; *exsiccata* published by many authors. All these collections have been well taken care of, and the phanerogams are mounted upon fine white paper. They will be sold undivided or in families or genera, and purchasers should address Th. M. Fries, Upsala, Sweden, before the end of May, stating the price offered per hundred.

REV. A. B. HERVEY, of Taunton, Mass., has prepared some exceedingly handsome slides of marine algæ. They are divided into two sets of six each. Set 1 shows the characteristic fruit of each of the 6 groups into which the *Florideæ* or red algæ naturally divide. Set 2 shows 3 different forms of the asexual spores of the *Florideæ*, and the sexual fruit of the lower algæ, viz: the *Cryptophyceæ, Zoosporeæ, Oosporeæ*. The writer must acknowledge that these slides came nearer filling a "felt want" in his laboratory, than any appliance has done for many a day. Heretofore his students had to exercise a large degree of faith in regard to the reproductive parts of these low and very interesting forms, but now seeing strengthens both belief and interest. As an educational series these slides are invaluable, and no laboratory or lecture room can afford

to be without them for they really illustrate every important feature of the reproductive machinery of the algæ. Either set costs $3.00, both together $5.00, with full explanatory text.

THE WRITER CONFESSES a delinquency which he wishes to correct both in himself and his botanical friends. We have an Association known as the American Association for the Advancement of Science, where workers in all departments of science are in the habit of meeting to have most pleasant and profitable intercourse. Zoologists, geologists, chemists and mathematicians flock to it in great numbers, but botanists are both few in number and modest in spirit. Where are the possessors of those long lists of names which fill page after page of our directories? There is now a section of biology where botany will have a fair chance, and botanists should avail themselves of this opportunity of becoming acquainted with each other. The next meeting will be held in Montreal, August 23d, as attractive a place for meeting as could well be imagined. The writer expects to be there, he is ashamed to say for the first time, and hopes to make hosts of botanical acquaintances. He does not offer his presence as an inducement for any one to attend, but simply to assure his readers that he intends to follow his own advice. Let us begin thus early to lay our plans for making the botanical subsection a very prominent feature of the next meeting. Go prepared not only to see something but to say something.

CHARLES ROBERT DARWIN died April 20, 1882. Just as we go to press this telegram has been received from London, accompanied by no particulars. He was born February 12, 1809, and the history of his long life is the common property of all intelligent people. Seldom has there been a life more busy or more fruitful, for it must be conceded that his powers of observation were phenomenal. His name has become so much a part of modern biology that it can never cease to be a familiar one. A great "path-breaker," many have followed in his footsteps and he had the good fortune to live long enough to see his work properly appreciated. It is almost needless to name his contributions to botany, for his books are in every library. Those with botanical subjects are as follows: "Fertilization of Orchids," "Insectivorous Plants," "Climbing Plants," "The Effect of Cross- and Self-Fertilization in the Vegetable Kingdom," and "Different Forms of Flowers in Plants of the same Species." His last book was upon the "Effect of the Earth-Worm on Vegetable Mould."

We may expect a notice in some degree worthy of the man from the pen of him who of all in this country knew him best, and with whom his name is so pleasantly associated in that delightful book, "Darwiniana."

BOTANICAL NECROLOGY for 1880, 1881 and thus far in 1882, as given in the *American Journal of Science* for April includes the following names:

Gen. Wm. Munro died near Taunton, England, Jan 29, 1880, at the age of 64.

Coe F. Austin, Closter, N. J., died March 18, 1880, at the age of 49.

Wm. Philip Schimper died March 20, 1880, at the age of 72.

Nils J. Andersson died at Stockholm, March 27, 1880, at the age of 59.

Dominique Alexandre Godron died at Nancy, August 16, 1880, at the age of 73.

S. B. Mead, Augusta, Ill., died November 11, 1880, at the age of 81.

W. Lauder Lindsay died November, 1880, at the age of 52.

Ernst Hampe died November 23, 1880, at the age of 85.

Alphonso Wood, West Farms, N. Y., died Jan. 4, 1881, at the age of 70.

Gottlieb Ludwig Rabenhorst died near Meissen, in Saxony, April 24, 1881, at the age of 74.

Matthias Jacob Schleiden died at Frankfort on the Maine, June 23, 1881, at the age of 77.

Theodore Schwann died at Liege, Belgium, early in the present year, at the age of 70.

Joseph Decaisne died at Paris, February 8, 1882, at the age of 74.

Thomas Potts James died at Cambridge, Mass., February 22, 1882, at the age of 78.

Wm. H. Leggett died in N. Y. City, April 11, 1882.

Charles Robert Darwin died April 20, 1882, at the age of 73.

The Genus Isoetes; by Dr. George Engelmann.—This is a pamphlet of 33 pages from the Transactions of the St. Louis Academy, Vol. IV, No. 2, and was read in February of this year. This insignificant genus was for a long time ignored by botanists and until thirty or forty years ago, the few specimens that were collected were referred to *I. lacustris*. Of course a genus that was attractive to no one else was just the one for Dr. Engelmann to study and the result is that we now wonder why so interesting a genus was not studied long ago. At least this pamphlet will spur us all to activity and its author will begin to hear frequently of more Isoetes. This paper is remarkable for its completness, containing all the information pertaining to the genus that can be given at the present time, though, to be sure, the literature of the subject has not yet become very extensive. First the author gives the history of the genus in North America, giving a complete list of the discoveries of the various species, from that of Pursh in 1806 (?) to that of the author and Mr. Pringle in 1881. Under the same heading is included a list of publications in reference to the genus.

Then follows an account of the morphology and biological elements of the members of this genus, the simplest vascular plants

known. The lobing of the trunk, the presence or absence of stomata, and the peripheral bast-bundles are noted as furnishing valuable characters for classification. The rarest patience has been shown in the careful dissection of tissues in hundreds of specimens not in all cases the best. The author advises any one who desires to study the structure of Isoetes to begin with the well known species and fresh specimens. The arrangement of the leaves varies from distichous to even the 21-34 order; their number from 5 or 10 to 100 or even 200; their length from ½ to 1 inch to 1 or 2 feet. The genus contains from 40 to 60 species, North America having 14, with 12 varieties. The systematic arrangement proposed is as follows:

I. TRUNK BILOBED.

A. Submerged species with quadrangular leaves, without, or in 4 and 5 with few or many stomata, and without peripheral bast bundles; velum incomplete.

1. *I. lacustris*. 2. *I. pygmæa*. 3. *I. Tuckermani*. 4. *I. echinospora*. 6. *I. Bolanderi*.

B. Amphibious species with abundant stomata in the quadrangular leaves.

* Without peripheral bast-bundles (these are intermediate between the submerged and the truly amphibious species).

† Velum partial.

6. *I saccharata*. 7. *I. riparia*.

†† Velum complete.

8. *I. melanospora*.

** With peripheral bast-bundles.

† Velum partial.

9. *I. Engelmanni*, 10. *I. Howelli*.

†† Velum complete.

11. *I. flaccida*.

C. Terrestrial species, maturing when entirely out of water, with abundant stomata and peripheral bast-bundles in the nearly triangular leaves.

* Velum partial or almost wanting.

12. *I. melanopoda*. 13. *I. Butleri*.

** Velum complete.

14 *I. Nuttallii*.

II. TRUNK TRILOBED. (Numerous stomata and bast-bundles in the quadrangular leaves; velum partial.)

15. *I. Cubana*. (From Cuba.)

In regard to geographical distribution the following quotation is made as it may be of service to collectors:

Only a small part of the North American continent has been well explored for Isoetes, and there, from Massachusetts to the Chesapeake Bay, they appear abundant enough; farther south, and in the whole interior and western part of the continent, they have thus far been found only in a few localities. Some species are quite local, as is the case, also, with many species of the old world, while others are widely distributed. Our two northern species are identical with or closely allied to European forms, all the others are quite distinct from such, so that there is scarcely more than a generic analogy between the species of our middle and southern regions with the Mediterranean ones or those of other regions of the globe.

The old Linnean *I. lacustris* is the only species which has been found to extend from the Atlantic to the Pacific States, and it probably occupies a northern belt of the northern hemisphere, though it seems not to have been discovered as yet in Asia. The American forms allied to *I. echinospora*, the other north European species, are the most common in the belt of northern States as far west as Michigan, and have been detected also on the western slope of the Rocky Mountains. Of the others, *I. Engelmanni* extends from Mssachusetts Georgia and westward to Missouri, though thus far not found anywhere else west of the Alleghany Mountains. *I. flaccida* is pecular to Florida and *I. Bolanderi* to the lakes of the western mountain chain, the Rocky Mountains as well as the Sierra Nevada. *I. melanopoda* occupies parts of the Mississippi Valley from Central Illinois to Northwestern Texas, while *I. Nuttallii* is the only species found in the valley of the Columbia river. All the other species seem to be nearly or quite local, *I. pygmæa*, in the Californian Sierra, but most of them on the Atlantic border; thus *I. Tuckermani* occurs only near Boston. *I. saccharata* on streams emptying into the Chesapeake Bay, and *I. melanospora* only on that peculiar and botanically interesting rock, the Stone Mountain of Georgia. Some species which seemed local have lately assumed a little wider range, though yet quite restricted; among these I mention *I. riparia* of the banks of the lower Delaware river which occurs also further north, and *I. Buileri*, first known only from the Indian Territory, now also found in Tennessee. There can be no doubt but that some of the apparently local species will yet be found in a more extended area, when botanists will include in their researches these obscure and inconspicuous plants.

New Species of Fungi, by Chas. H. Peck.—HYMENOCHÆTE MULTISPINULOSA.—Resupinate, dark reddish-brown, the margin paler, the hymenium velvety by reason of the numerous setæ, uneven, tuberculose, cracking into small areas; setæ straight or slightly flexuous, crowded, .0025–.0045 of an inch long, arising from and often persistently attached to the paler filaments of the substratum.

Surface of decaying wood. Arizona, April. *C. G. Pringle.*

This fungus approaches, in some respects, the subgenus *Veluticeps*. The specimens are sterile. The color is somewhat darker than that of *H. corrugata.*

HYMENULA LYCHNIDIS.—Minute, punctiform, disk whitish or pallid, surrounded by a black margin; spores oblong-cylindrical or subclavate, colorless, .0005–.0008 of an inch long, .00016 broad.

Dead or languishing leaves of Lychnis. California, July. *M. E. Jones.*

To the naked eye this fungus appears like minute black dots, but when magnified the dots are seen to be the black margin, which surrounds a pale disk.

LYCOPERDON PACHYDERMUM.—Subglobose, four to six inches in diameter, the radicating base somewhat pointed, the external peridium thin, smooth, whitish, the upper part cracking into small angular persistent spot-like scales or areas, the inner peridium thick, subcorky, somewhat brittle, the upper part at length breaking up into irregular fragments; capillitium and spores ochraceous-brown, the filaments long, flexuous, somewhat branched, .0003 of an inch thick;

spores subglobose or broadly elliptical, .0002–.00025 of an inch long.

Arizona, June. *Pringle.*

This is a singular species of *Lycoperdon*, belonging to the section *Bovistoides*, but having the peridium of unusual thickness. It is also apparently destitute of any cellular base, in which respect it approaches the genus *Bovista*, but the character of the threads of the capillitium points to *Lycoperdon* as its proper genus.

HENDERSONIA CEREI.—Perithecia minute, hemispherical, sometimes collapsed or depressed about the papilliform ostiolum, black: spores numerous, oblong, colored, triseptate, constricted at the septa, .0008–.0009 of an inch long, about .0003 broad, the second cell from the apex sometimes divided by a longitudinal septum.

Dead wood of *Cereus giganteus*. Arizona, April. *Pringle.*

The division of the second cell of some of the spores indicates an approach to the genus *Dichomera* Cooke, *Camarosporium* Schulz.

ASTEROMA PRINGLEI.—Spots orbicular, epiphyllous, black, two to four lines broad, the tips of the radiating hyphæ sometimes dilated; perithecia convex, black, irregularly or sometimes concentrically arranged; spores large, oblong or subfusiform, generally acute at the extremities, slightly colored, .0016–.002 of an inch long, .0005–.0006 broad, often with one to three nuclei.

Leaves of *Quercus hypoleuca*. Arizona, July. *Pringle.*

Most of the specimens are sterile, and those that are fertile do not appear to be in very good condition.

USTILAGO CYLINDRICA.—Attacking the spikes of the host plant and converting them into a cylindrical mass of spores six to ten lines long, about one line thick, invested by a thin cinereous at length lacerated membrane; spores subglobose, minutely roughened, brownish-black, .00035–.0004 of an inch in diameter, intermingled with large irregular unequal pale cellular bodies .0008–.0014 of an inch broad.

Grass. Arizona, June. *Pringle.*

The host plant is probably some species of *Andropogon*. The cylindrical mass into which the inflorescence is converted by the fungus resembles somewhat the ergot of rye in external appearance, but it is usually more slender than the ergot. The rachis forms a white central columella which runs through the mass of spores.

PILEOLARIA EFFUSA.—Forming a continuous or circumambient velvety reddish-brown stratum over the young branches, petioles and leaves of the host plant; spores subglobose, minutely roughened, .00096–.0011 of an inch in diameter, uninucleate; pedicel short, colorless, .0005–.0008 of an inch long.

Living branches and leaves of Rhus, probably *R. aromatica* or *R. triloba*.

Arizona. May. *Pringle.*

This is very distinct from *Pileolaria brevipes*, our eastern

species, both in its effused mode of growth and in its much shorter pedicel, whose length is scarcely equal to the diameter of the spore.

UROMYCES COMPACTA.—Spots none or obsolete; sori compact, orbicular or oblong, blackish-brown; spores elliptical or oblong, obtuse or bluntly pointed, .0014–.0019 of an inch long, .0009–.001 broad; pedicel colorless, equalling or exceeding the spore in length.

Dead stems of some "Composite plant." Arizona. May. *Pringle.*

UROMYCES VERSATILIS.—Spots none; sori numerous, minute, amphigenous, rotund or oblong, slightly elevated, ochraceous-brown; spores oblong or oblong-pyriform, generally separating from the pedicel when old, .0009–.0012 of an inch long, .0005–.0006 broad; pedicel short.

Living branches, petioles and leaves of *Acacia Greggii.* Arizona. May. *Pringle.*

This is an aberrant species, and approaches *Trichobasis* in its deciduous spores. The young spores are subglobose and borne on pedicels larger than themselves, thus resembling the paraphyses of some species of *Lecythea.* The color of the spores is pale ferruginous, or reddish-brown with an ochraceous tint. The fungus is abundant on the young branches as well as on the leaves of the host plant.

PUCCINIA GAYOPHYTI.—Spots none; sori small, scattered, amphigenous, reddish-brown; spores obovate or subelliptical, generally constricted at the septum, obtuse, smooth, .0012–.0016 of an inch long, .0008–.00095 broad; pedicel short, colorless.

Living leaves of species of *Gayophytum.* Soda Springs, California. *Jones.* Northern California. Aug. *Pringle.*

PERIDERMIUM FILAMENTOSUM.—Peridia numerous, irregularly arranged, erumpent, three or four lines long, one or two lines broad, cylindrical or subcompressed, obtuse at the apex, membranous, whitish when evacuated, containing a central bundle of loose percurrent concolorous longitudinal filaments which are attached to the inner surface at the apex; spores varying from subglobose or broadly elliptical to oblong-ovate or oblong-elliptical, yellow-orange, .0011–.0013 of an inch long, .00064–.0008 broad, epispore thick, minutely roughened.

Living branches of *Pinus ponderosa.* Arizona. July. *Pringle.*

This is a very interesting species. Its peculiarity is found in the central longitudinal filaments which extend through the mass of spores from the base to the apex of the peridium. The surface of these filaments is covered with minute protuberances which appear when magnified as if they might be immature spores. In the specimens before me none of the peridia are open at the apex, and in this respect also a remarkable departure is made from the generic character. The peridia in some of the specimens are longitudinally ruptured, thus indicating a relationship to the genus *Ræstelia.*

They are generally terete but sometimes a little flattened or compressed. The central filaments tend to hold the spores in mass so that they do not fall away as readily as in other species, and their attachment to the apex of the peridium appears to interfere with its rupturing at that point. Two other species, viz: *Peridium Pini* Lev. and *Peridium Harknessii* Moore, have been reported as inhabitants of *Pinus ponderosa*.

DOTHIDEA DASYLIRII.—Stroma amphigenous, small, narrowly elliptical, oblong or linear, black, for a long time covered by the epidermis which is at length ruptured longitudinally; cells few, white within; asci oblong or subcylindrical; spores crowded or biseriate, oblong, often a little broader toward one end, colorless, .0012–.0017 of an inch long, .00065–.00075 broad.

Leaves of some species of *Dasylirion*, probably *D. Wheeleri*. Arizona. May. *Pringle*.

DOTHIDEA PRINGLEI.—Stroma irregular in shape, variable in size, two to twelve lines long, penetrating the matrix deeply, amphigenous, black, surface uneven, coarsely papillose by the scattered slightly prominent ostiola, cells unequal, deeply seated; asci cylindrical; spores oblong-elliptical, smooth, uniseriate, colored, .0012–.0016 of an inch long, .0008 broad, often containing two or more nuclei.

Living and languishing leaves of *Yucca macrocarpa*. Arizona. May. *Pringle*.

Sometimes the surface of the stroma is shining, but usually it is opaque.

TEICHOSPORA ARIDOPHILA.—Perithecia minute, .01–.012 of an inch in diameter, scattered, hemispherical or depressed, black, ostiolum minute, papilliform; asci subcylindrical, .0045–.0048 of an inch long, .0011–.0012 broad; spores crowded or biseriate, oblong or obovate, slightly constricted in the middle, muriform, colored, .0011–.0014 of an inch long, .0005–.0006 broad.

Bleached surface of dry wood. Arizona. May. *Pringle*.

This species is closely related to *T. obducens*, but differs so much in habit, that it seems best to separate it.

Selenia aurea.—Growing with the normal form of this species, having *golden yellow* petals, is a variety with the petals pale canary yellow.

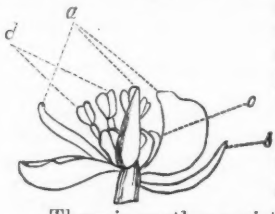
This species has fragrant flowers. The pleasant oder is wafted with the wind to a considerable distance from a large patch.

The golden yellow of the petals is so intense that it is painful to the eyes to look for any length of time at a large patch in the bright sunshine.

The flowers are so conspicuous they would make a striking appearance in a flower garden planted in bunches.—F. L. HARVEY.

Notes on Ranunculus.—While examining some specimens

of *R. abortivus*, var. *micranthus*, my attention was called to a singular structure in a head of carpels and occupying the normal position of an achenium. Upon examination it proved to be a flower of the following structure. The flower was raised on a short peduncle and subtended by a bract (b). The calyx (a) was very irregular, no two of the *four* sepals being of the same shape. The corolla was obsolete. The stamens (d), eight in number, were nearly normal though in some the filament and anther seemed to blend. There were about ten carpels (c) of normal shape excepting the beak was somewhat elongated. The accompanying figure shows the relation of the parts, but is greatly magnified, the flower really being no longer than one of the carpels. The stamens and petals of the flower, in the head of which this structure occurred, had fallen.



This variety of *R. abortivus* in this region has the carpels in an elongated head, the length being often twice the diameter.

There is another variety of this species (var. *grandiflora*) which grows upon cliffs high above the valleys, in which the petals far exceed the sepals in length, and the flower expands half an inch.

Ranunculus fascicularis, Muhl., has in this region entire root-leaves and beginners *invariably* place it along with *R. rhomboideus*, if they use Gray's Manual, as this "root leaves are not divided to the very base." Is it unusual for this plant to have entire root-leaves, or is there some defect in the key?—F. L. HARVEY, *Fayetteville, Ark.*

A Synopsis of the North American Lichens:* Part I, comprising the Parmeliacei, Cladoniei, and Cœnogoniei; by Edward Tuckerman, M. A.; Boston, S. E. Cassino, 1882.—This book is exactly what is needed to give an impetus to the study of Lichens. Heretofore very few botanists have been attracted to their study from the great lack of convenient literature, but one can hardly turn over the handsomely printed pages of this little octavo volume without feeling a desire to cultivate a field that has so long been neglected. If ever the proverbial "felt want" was a real one it was in this case; and has been supplied by the only person really able to publish an authoritative work of this kind. In this book of some 260 pages the author has described the species of one tribe, the *Parmeliacei*, containing nearly 40 genera, and two families under the tribe *Lecideacei*, namely, *Cladonei* and *Cœnogonei*; both of which add but four genera. These comprise the more conspicuous lichens, just those to which students are first attracted. In view of the

*The above notice was prepared for the April GAZETTE, but by mistake was omitted.

unsettled condition of this group of plants it must be exceedingly difficult for a philosophical mind to feel satisfied in their study, and this is apparently exactly Prof. Tuckerman's position. The ordinary multiplier of species would meet with no difficulty, but would reap a rich harvest among the bewildering display of forms; but our author has no such thought and with evident reluctance sends out the present book with its species, "in great part, sufficiently well settled." All through the work one finds new things described, but not as yet admitted to specific rank, and having only provisional places. These, we are told, the author would have preferred to keep back, "with Horace, *nonum in annum*." We are thankful however that he did not in this case follow literally the precepts of the genial poet, for this work will enable more of us to help the author in fixing the uncertain forms. There is usually no loss in putting out a tentative work, for observers are never so provoked into reporting their observations as when they think they are correcting blunders. Our author also thinks that Lichenology has not kept pace with the "diagnostic enumeration of new forms called arbitrarily species;" which same may be said of some other groups of plants. As students of Phænogamic Botany are in the habit of looking to Robert Brown as the most philosophical observer, so the students of Lichens look with equal veneration upon Elias Fries.

In some 20 pages of introduction Prof. Tuckerman gives a capital view of the present status of our knowledge concerning lichens. This is followed by a list of recent authors and a key to the 72 genera, grouped under the two series, *Gymnocarpi*, and *Angiocarpi*, names that remind us of our series of Dicotyledons. Then follows the body of the work, containing quite a full description of characters, localities, and relations of the species. Our copy happened to be faulty, lacking pages 257–260 and thus depriving us of two or three small genera; nor could we find *Thamnolia* in the index, although it appears in the body of the work.

Nearly 500 species are described, the largest genus being *Lecanora*, numbering 56 species. The other large genera are *Cladonia* with 35 species, *Parmelia* 30, *Placodium* 28, *Collema* 27, *Leptogium* 25, *Pannaria* 24, *Cetraria* 22, and *Physcia* and *Sticta* each 21. This shows remarkable uniformity in the size of the genera; but in the other genera the number of species drops very rapidly into the single digits.

It is to be hoped and expected that one of the results of this book will be the more earnest study of this puzzling group of plants, which very fact will hasten the reading of many riddles. There is no reason now why Lichens should not have as many devotees as most other groups of Cryptogamia.—J. M. C.

Action of Acids on Cellulose.—"Acids (especially sulphuric acid) *when greatly diluted** cause starch grains and cellulose at the

*Italics mine. L. S.

ordinary temperature to swell up much more violently than pure water, without however destroying their organization."—Sachs' Text-book of Botany, Bennett & Dyers' Trans., p. 592.

Accompanying the above statement, Sachs gives a figure of the bast-fibers from the leaf of *Hoya carnosa* as they appear after treatment with suphuric acid and iodine. All my attempts to obtain these appearances with "greatly diluted" sulphuric acid having failed, I repeated the experiment using acid (C. P.) of known strength. No perceptible effect was produced by the application to different specimens ofdilutions containing 20, 30, 40 or 50 per cent. of acid. Sixty per cent. acid however produced the extraordinary swelling as figured by Sachs. Similar experiments were tried with the bast-fibers from the leaves of *Yucca aloifolia* and *Latonia Borbonica* with similar results. It seems to me that 60 p. c. acid can hardly be said to be "greatly diluted."

Can any one explain the discrepancy?—LIZZIE SHOEMAKER, *Botanical Laboratory, Purdue University, LaFayette, Ind.*

A Bit of Fern History.—In reviewing the history of some of our rare ferns during the past ten years, it is interesting to note the changes which have occurred in their comparative scarcity and abundance.

Ten years ago *Botrychium simplex* was so great a rarity that one might almost despair of ever obtaining a specimen; now it is plentiful enough, obtainable with little or no difficulty, and seldom called for in exchange. In Massachusetts it had not been collected for many years, when E. S. Wheeler detected it in Berlin, in 1878. Since then it has only been recorded twice—both times from Essex Co.—and is still rare in the State where it was originally discovered by Rev. Edward Hitchcock, in 1822. When E. S. Miller found it on Long Island, N. Y., in 1873, those who were able to secure specimens from him, regarded themselves as fortunate indeed. But in 1877 Mrs. Chas. Barnes, of Syracuse, found it so plentiful in the North Woods that she was able to supply many demands for it, while in the same year Mr. Pringle found it equally plentiful in Vermont. Since then it has continued to turn up at intervals in different localities from Maine to California, until probably no one who has made any effort to make up a collection of North American Ferns is without a specimen.

The writer recalls the pleasurable emotions with which he first received imperfect specimens of *Asplenium myriophyllum* and *Cheilanthes Lindheimeri*, at that time desiderata so rare as seemingly to be placed beyond reach. The first of these was received from Dr. Chapman himself—the specimen being the last of the original collection made by him twenty years before, a fact which enhanced its value greatly—and the writer still remembers how eagerly some friends received, and how much they prized the precious bits which he ventured to detach from his specimen to share with them. But

since its re-discovery by Mr. Shockley in 1878, the collections of J. Donnell Smith, Miss Reynolds and A. H. Curtiss have left no excuse for anyone's being without a specimen.

Cheilanthes Lindheimeri has also been placed within the reach of all through the recent collections of H. H. Rusby, C. G. Pringle and others, who have found it plentiful in New Mexico and Arizona —it being especially abundant along the foot-hills in the mountain ranges of the south-eastern portion of the last named territory.

In making up a list of ferns considered rare, or difficult to obtain when the writer began his herbarium in 1873, the following may be given:

1. Acrostichum aureum.
2. Polypodium Plumula.
3. falcatum.
4. Scouleri.
5. Phyllitis.
6. Gymnogramme hispida, (Then the *G. pedata* of our check lists.)
7. Notholæna sinuata.
8. ferruginea.
9. candida.
10. dealbata.
11. Newberryi.
12. Hookeri. (Then *N. cretacea*).
13. Fendleri.
14. Cheilanthes Californica.
15. Wrightii
16. microphylla.
17. Alabamensis.
18. tomentosa.
19. Eatoni.
20. myriophylla.?
21. Lindheimeri.
22. argentea. (Doubtfully admitted).
23. Cryptogramme acrostichoides.
24. Pellœa Breweri.
25. Bridgesii.
26. aspera.(Then *Cheilanthes aspera*).
27. ternifolia.
28. Wrightii.
29. flexuosa.
30. pulchella.
31. densa.
32. Pteris longifolia.
33. Cretica.
34. Adiantum tricholepis. (The *A. pilosum* of that date).
35. Blechnum serrulatum.
36. Lomaria spicant.
37. Asplenium pinnatifidum.
38. ebenoides.
39. parvulum.
40. viride.
41. dentatum.
42. Bradleyi.
43. septentrionale.
44. myriophyllum.
45. Phegopteris alpestris.
46. Aspidium Lonchitis.
47. fragrans.
48. juglandifolium.
49. Cystopteris montana.
50. Woodsia hyperborea.
51. glabella
52. scopulina.
53. Oregana.
54. Nephrolepis exaltata.
55. Trichomanes Petersii.
56. Schizœa pusilla.
57. Aneimia Mexicana.
58. adiantifolia.
59. Botrychium simplex.
60. Lunaria.
61. boreale.
62. Ophioglossum nudicaule.
63. crotalophoroides. (Then *O. bulbosum*).

During the succeeding five years very little or no decided change took place in the status of any of these species, while at the close of that period the list might have been increased by the addition of the following:

64. Polypodium pectinatum.
65. Notholæna Parryi.
66. tenera.
67. Cheilanthes leucopoda.
68. Clevelandii.
69. Cooperæ.
70. Pteris serrulata.
71. Adiantum tenerum.
72. Asplenium firmum.
73. cicutarium.
74. Aspidium unitum.
75. Ophioglossum palmatum.

Here we have 75 species which might have been considered rare at the beginning of 1878, more than one half of the whole number of species then known. It will be observed, however, that the greater number of these species were southern—mostly in the gulf-states—and south-western, extending through the territories into California, with only an occasional species in the north, and one might have inferred from this that, for most part, they were rare only because of the partial explorations in those regions.

Subsequently a marked change began. The growing interest in fern pursuits, stimulated by the inspiriting work on our North American Ferns by Prof. Eaton—to whom we are all under such deep obligations, and who is justly to be regarded as the founder of systematic American Pteridology—led to many nearly simultaneous efforts on the part of numerous collectors which resulted in making a large percentage of our rare ferns common, others more readily obtainable, and adding other species to our national flora.

In 1877–78 the lamented Dr. Garber was in Florida, making finer specimens of Florida ferns than had been seen before, and bringing to light many hidden treasures. The re-discovery of *Asplenium dentatum*, *Pteris longifolia*, and the discovery of *Asplenium serratum* and *Ceratopteris thalictroides* in that state will always be associated with his ever to be remembered name.

The veteran Chapman, who in his old age seemed to have quaffed an invigorating draught from that "Fountain," for which Ponce de Leon sought so long in vain, not to be outdone, had signaled the renewal of his activity, and shed new lustre on his honored name by the fine discovery of *Ophioglossum palmatum* in 1875; and now, the discovery of *Asplenium cicutarium* by Capt. C. F. Adams, the re-discovery of *Asplenium myriophyllum* and *Pteris Cretica* by Mr. Shockley, was followed by the fine collections of J. Donnell Smith, and his splendid discovery of *Aspidium conterminum*.

Latterly that indefatigable botanical collector, A. H. Curtiss, has been vigorously pushing his explorations of the southern coast region of Florida out on to the Florida Keys with excellent results, supplying prominent herbaria with his fine complete specimens and adding *Cheilanthes microphylla*, *Aspidium trifoliatum*, *Tænitis lanceolata* and *Polypodium Swartzii* to the flora of that state—the two, and at the time of collection, the three last of these being new to the United States as well.

The discovery of *Asplenium viride*, *Woodsia hyperborea* and *Botrychium simplex* in Vermont by C. G. Pringle; of *Botrychium Lunaria* in Connecticut by Oscar Harger and Dr. F. W. Hall; of *Asplenium ebenoides* in the same state by J. S. Adam, and in New York state by Clarence Lown; the unexpected discovery of *Scolopendrium vulgare* in Tennessee by Mr. Cheathem, as recorded by John Williamson; the re-discovery of *Botrychium boreale*—doubly interesting as a verification of Milde's re-

corded station for it—,with the original discovery of *Aspidium Oreopteris* in Unalaska by L. M. Turner; of *Aspidium Mohrioides* in California by J. G. Lemmon; of *Cystopteris montana*, *Aspidium Lonchitis* and *Botrychium Lunaria* in Colorado by T. S. Brandegee; of *Notholæna Grayi* in Arizona by W. M. Courtis; of *Notholæna Lemmoni* and *N. nivea* in the same territory by Lemmon; *Cheilanthes Parishii* in California by the Parish Bros.; the re-discovery of *Pellæa aspera* in Texas by Dr. Edward Palmer, with many other interesting discoveries which have been recorded from time to time, marked this period, while recent collectors have so changed the status of the southern and southwestern ferns that our previous lists may now be reduced to the following, which will be interesting for comparisons five or ten years hence:

1. Notholæna ferruginea.
2. " tenera.
3. Cheilanthes leucopoda.
4. " microphylla.
5. " myriophylla.? (As understood by the writer)
6. " argentea. (Its actual presence yet to be verified).
7. Pellœa Breweri.
8. " Bridgesii.
9. " aspera.
10. " pulchella.
11. " ternifolia.
12. " flexuosa.
13. Pteris serrulata.
14. " longifolia.
15. Adiantum tricholepis.
16. Asplenium ebenoides,
17. " dentatum.
18. " Bradleyi.
19. " septentrionale.
20. " cicutarium.
21. Phegopteris alpestris.
22. Aspidium Lonchitis.
23. " fragrans.
24. " juglandifolium.
25. Cystopteris montana.
26. Woodsia hyperborea.
27. " glabella.
28. Trichomanes Petersii.
29. Schizœa pusilla.
30. Aneimia Mexicana.
31. " adiantifolia.
32. Botrychium boreale.
33. Ophioglossum nudicaule.
34. " crotalophoroides.
35. " palmatum.

Here we have a reduction of more than one half from the list as given before, but to these may be added the more recent discoveries of

36. Polypodium Swartzii.
37. Notholæna nivea.
38. " Grayi—plentiful enough in Arizona, but not fairly in distribution.
39. " Lemmoni— " " " " " " " " "
40. Cheilanthes Parishii.
41. Asplenium serratum.
42. Tænitis lanceolata.
43. Aspidium trifoliatum.
44. " Oreopteris.
45. " conterminum.
46. Woodsia Mexicana.
47. Ceratopteris thalictroides.

making a total number of 47 species which may be regarded as rare ferns or which are not easily obtained at the present time. The experience already recorded, however, justifies the belief that many of these will be found plentiful enough when the regions where they grow are more thoroughly explored, while the increasing railroad facilities and communications are opening to the botan-

ist vast regions before almost inaccessible and holding out promises of many further additions to our fern flora.

There are, however, seemingly a few ferns that remain rare, even in well explored regions, and others so local, that, although they may be obtained without much difficulty, they must still be regarded as rare ferns on account of their restricted local distribu tion. Of the former class *Asplenium ebenoides* may be cited as an example, and of the latter *Schizæa pusilla*, which is wholly restricted as far as now known to a very limited area in New Jersey and the single station recently discovered in Nova Scotia by Miss, Knight. No where else has this little fern been found, and although it is apparently quite plentiful, its limited area should teach moderation in collecting it, lest in time it become wholly eradicated and lost.—GEO. E. DAVENPORT, *Medford, Mass.*

SUB.-NOTE.—An instance of the unexpected manner in which rare ferns occasionally turn up occurs in the recent discovery or rediscovery of *Ophioglossum nudicaule* in San Diego, California, by Dr. C. C. Parry.

Dr. Parry found this fern in San Diego as long ago as 1850, while connected with the Mexican Boundary Survey, but it was not identified at that time, and losing his specimens while crossing the Isthmus he has never been able to verify his discovery until now. I have received specimens from Dr. Parry and also from Daniel Cleveland, Esq., who was with him at the time of his interesting re-discovery of the plant in March last.—G. E. D.

Pholisma arenarium, Nutt.—The statement is made in the Botany of California (vol. I. p. 464) that this plant grows in "sandy soil and at the base of hills, near Monterey and San Diego, Douglas, Nuttall, &c. Parasitic on the roots of oaks?"

I have been unable to learn that any specimens of this plant were collected by any one but Nuttall, and at San Diego, in 1835–6, until it was re-collected by me in 1875. The fruit is known only from my specimens. This plant is parasitic on the roots of *Eriodyction tomentosum*, and not upon the roots of Oaks. It grows in sandy spots, in groups of from twenty-five to fifty, or more.—D. CLEVELAND, *San Diego, California.*

Jasminum odoratissimum.—One of my college students, Mr. E. W. Shedd, of the Sophomore class of Brown University, was at work the other day in describing by schedule a branch of *Jasminum odoratissimum*. He called my attention to a peculiarity of the corolla. It will be remembered that this is salverform, with five spreading lobes. In the plant under examination, which is before me as I write, two of the lobes of all the flowers differ from the rest in their calceolate form. These two lobes are the opposed ones, though there is an evident tendency in all to become slipper-form. I do not observe any accompanying alteration of the essential organs. I find the college students very quick to observe any deviations from a normal condition.—W. W. BAILEY, *Brown University.*